Utility Patent Application

CONFIDENTIAL INFORMATION

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MANUAL PURGE SYSTEM FOR INSTRUMENTATION FLOW ELEMENT TUBING

RELATED APPLICATIONS

There are no previously filed, nor currently any co-pending applications, anywhere in the world.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to fluid communication tubing of the type used in fluid flow sensing elements for measuring fluid flowrates, and more specifically to a manual purge system for periodically cleaning such tubing

2. Description of the Related Art

As is well-known in the art, fluid communication tubing, or "instrument

tubing", is commonly used to communicate an instrument signal, in the form of a pneumatic pressure signal, between flow elements and pressure transmitters. Such pressure transmitters, or, more accurately, differential pressure transmitters, are commonly available to measure a pneumatic pressure, relative to atmospheric pressure, within a process system as measured by a flow element. The Pitot tube has long been a standard flow measuring element used throughout the process industries. However, in recent years improvements in such a system have been developed, as disclosed and described in U.S. Patent No. 5,736,651, issued to the present inventor, and incorporated by reference as if fully re-written herein.

Some Pitot tube or Pitot-array flow element applicains involve measurement of particulate-laden air. A problem occurs from the use of such instrument tubing in that the traverse and sensing tubes of the fluid flow sensing elements can become obstructed by particulate within the fluid stream and therefore require frequent cleaning in order to maintain accuracy and consistency. The amount of particulate in the flowing fluid is not always specifically known or measurable, and the decision that there is a need to purge flow sensing elements is not a simple one. The amount of dirt or particulate within the fluid flow stream is difficult to quantify, and can be variable over time and work cycles. One manner of dealing with flow element purging has been to develop complicated and costly automatic purge systems that work on a timed,

or other, automatically calculated basis. However, such a system is generally expensive, potentially inappropriate for the particular application, and can lead to an over engineered solution to an intermittent problem.

An alternative to the over-engineered system is the on-site determination to manually purge instrument sensing tubes. Generally, in order to make such a decision, some minimal data input is required, such as an indication of pressure loss or gain in a manner that would indicate to the operator that the sensing tubes have obstructed sensing orifices. However, such a system is usually a make-shift design, and is not upgradable to an automatically timed purge system.

Consequently, a need has been felt for providing an apparatus and method which allows for an inexpensively installed manual purge system that allows the user to determine how often purging is required and, if justified, can be adapted to the use of an automatic purge system.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved manual purge system for periodically cleaning pressure sensing flow element tubing.

It is a feature of the present invention to provide an improved manual purge system that is a complete self-contained system for allowing manual

determination and initiation of flow element purging.

Briefly described according to one embodiment of the present invention, a flow element manual purge system is provided as a system ready to install to instrument tubing connected to the high pressure connection and low pressure connection of the differential pressure flow element. The system has a first purge/operate valve connected to the high pressure tubing, and a second purge/operate valve connected to the low pressure tubing. Each purge/operate valve is anticipated as being a three-way valve having an entry port, an exit port, and a discharge port. With the entry port in fluid communication with the pressure tubing, the discharge port is in fluid communication with a high pressure purge gas or liquid source, depending upon whether the flowing fluid is gas or liquid. Each exit port is in fluid communication with the inlets of an instrument zeroing and isolating valve, with the outlets of the zeroing and isolating valve in fluid communication with a differential pressure gauge.

An advantage of the present invention is that it provides an improved manual purge system that is a complete self-contained system for allowing manual determination and initiation of flow element purging.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages and features of the present invention will become better understood with reference to the following more detailed description and claims

taken in conjunction with the accompanying drawings, in which like elements are identified with like symbols, and in which:

FIG. 1 is a functional schematic diagram of the manual purge system according to the preferred embodiment of the present invention; and

FIG. 2 is a front elevational view thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The best mode for carrying out the invention is presented in terms of its preferred embodiment, herein depicted within the Figures.

1. Detailed Description of the Figures

Referring now to FIG. 1-2, a flow element manual purge system 10 is shown, according to the present invention, ready to install to instrument tubing 12 connected to the high pressure connection 14 and low pressure connection 16 of a flow element 18. The system 10 has a first purge/operate valve 20 connected to the high pressure tubing 12, and a second purge/operate valve 22 connected to the low pressure tubing 12. Each purge/operate valve 20, 22 is anticipated as being a three-way valve having an entry port 20a, 22a, an exit port 20b, 22b, and a discharge port 20c, 22c. With the entry port 20a, 22a in fluid communication with the pressure tubing 12, the discharge port 20c, 22c is in fluid communication with a high pressure purge source 30. Each exit port 20b, 22b is in fluid communication with the a pair of inlets 32a, 32b, respectively of an

instrument zeroing and isolating valve 32, with the outlets 32c, 32d of the zeroing and isolating valve 32 in fluid communication with a differential pressure instrument 34. The use of this three-way valve permits "zero check and adjustment" of a differential pressure instrument by isolating the instrument from the process connections.

2. Operation of the Preferred Embodiment

To use the present invention, the flow measuring instrument must be isolated from the flow element prior to the beginning of a purge cycle. If the instrument is a transmitter, provisions must be made to maintain the existing instrument output signal to the receiver instrument. This is done within the capability of some pressure instruments, but otherwise it must be done by the receiver instrument or else the system must be put into manual operating mode until the purge cycle is complete.

The main purge supply valve from the purge fluid source 30 is opened and the two purge valves, one on each of the two instrument lines, are then opened, admitting high pressure purge fluid to the lines connecting the flow element and the instrument. The purge fluid application point must be close to the instrument to assure purging of all of the piping from the instrument to the flow element.

The instrument tubing must be large enough so as not to restrict the high

volume purge fluid flow. A purge flow meter can be added downstream of the purge valve to monitor the purge rate. No flow at this point during the purge process indicates that the flow element is completely plugged and requires more drastic intervention. If heavy plugging is suspected, the tubes must be brushed manually or otherwise removed for cleaning. If the normal operation is intermittent, any cleaning can be done during downtime of the flow measurement system.

The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents. Therefore, the scope of the invention is to be limited only by the following claims.